3. EXISTING ENVIRONMENT

3.1 SITE DESCRIPTION, LAND USE, AND AESTHETICS

The proposed project would be located at Greenidge Station in Yates County, New York, along the western shore of Seneca Lake (Figure 2.1.1). The equipment and surrounding access space for the proposed project would occupy a total of about 3 acres of land, which currently serves as a paved laydown area and contractor parking lot adjacent to the existing powerhouse for Units 3 and 4.

Yates County is primarily rural, with over 73% of its population classified as "rural" and 27% as "urban" in the 2000 U.S. Census (U.S. Census Bureau 2004a). Agriculture, particularly that associated with vineyards and wine-making, is becoming an increasingly important land use in the county. While the amount of land in farms and the number of full-time farms decreased by 3% and 8%, respectively, in the state of New York between 1992 and 1997, they increased by 3% and 8%, respectively, in Yates County during the same period (USDA 1997).

The proposed project site is located within an existing industrial area (Greenidge Station) that is surrounded primarily by agricultural and rural residential land uses. The Greenidge Station property is bounded to the east by Seneca Lake. The area south of the Greenidge Station property is used for a variety of purposes, including manufacturing at the Ferro Electronic Materials plant (which employs about 200 workers), but is primarily agricultural with rural residences interspersed with vineyards and wineries. The areas west and north of the Greenidge Station property are also primarily agricultural, but with more residences (including the village of Dresden) and small commercial developments along State Highway 14.

The visual landscape of the Greenidge Station property is conspicuously marked with industrial facilities such as the powerhouse, ESP equipment, smokestacks, coal storage piles, ash storage silos, railroad facilities, and other associated infrastructure (Figure 2.1.3). The power plant is visible from the surrounding local area, including from nearby Seneca Lake.

3.2 ATMOSPHERIC RESOURCES

3.2.1 Climate

The regional climate, which is classified as humid continental, is influenced by the passage of multiple types of air masses. Cold, dry air frequently arrives from the northern interior of the continent, while winds from the south and southwest transport warm, humid air from the Gulf of Mexico and adjacent subtropical waters. These two air masses provide the dominant characteristics of the area’s climate. A third type of air mass occasionally flows inland from the Atlantic Ocean to produce cool, cloudy, and damp weather conditions.

Winters are generally long and cold, with an average of 137 days per year with temperatures below 32°F and an average of 5 days per year with temperatures below 0°F (as measured at Penn Yan, the nearest monitoring station, which is located about 7 miles to the west of Greenidge Station). In January, the daily maximum temperature is 33°F, on average, while the daily minimum is 17°F. Average annual snowfall is about 54 in. Summers are pleasantly warm, with an average of 11 days per year with temperatures

above 90°F. In July, the daily maximum temperature is 83°F, on average, while the daily minimum is 61°F. Annual precipitation (excluding snow) averages about 31 in. The distribution of precipitation is fairly uniform during the year, ranging from around 2 in. during the winter months to around 3 in. during the summer months. As depicted in Figure 3.2.1, prevailing winds at Penn Yan are dominantly from the southwest quadrant with few winds from the easterly and northeasterly directions.

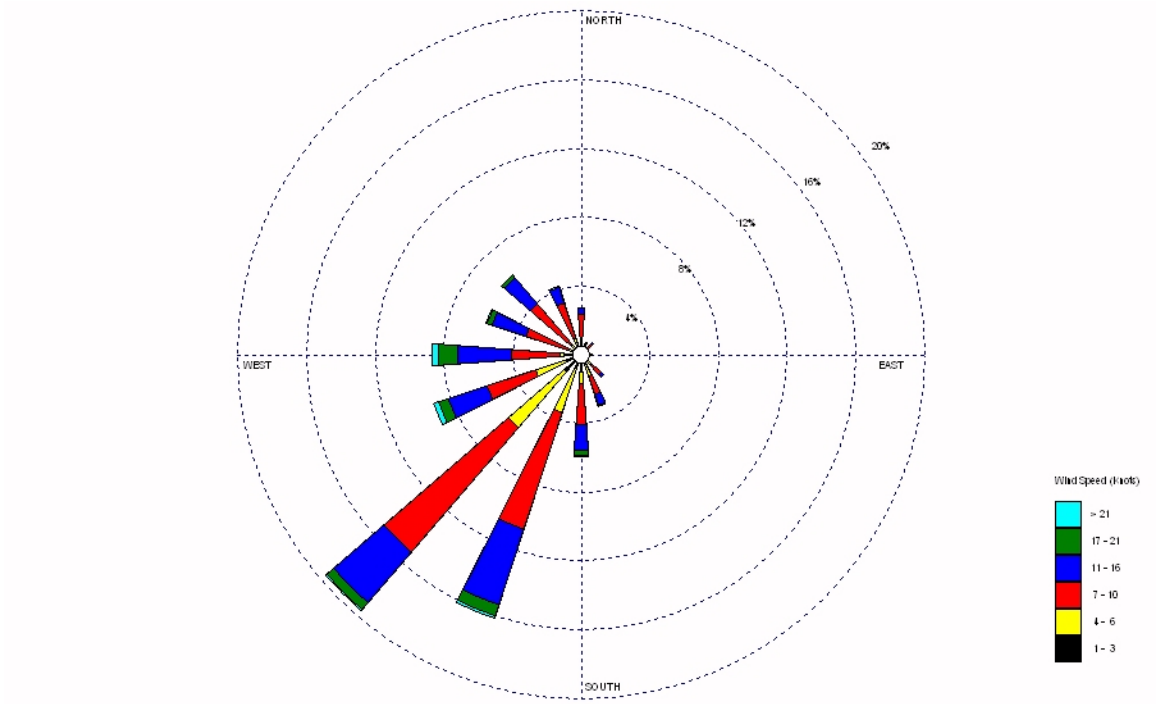

Figure 3.2.1. Wind rose for Penn Yan, New York (1999-2003). The frequency of wind blowing from each direction is plotted as a bar that extends from the center of the diagram. Wind speeds are denoted by bar widths and shading; the frequency of wind speed within each wind direction is depicted according to the length of that section of the bar. Because the wind rose displays directions **from** which the wind blows, emissions would travel downwind in the opposite direction.

3.2.2 Air Quality

Criteria pollutants are defined as those for which National Ambient Air Quality Standards (NAAQS) exist (Table 3.2.1). These pollutants are sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), lead (Pb), and particulate matter less than or equal to 10 µm in aerodynamic diameter, designated PM-10. The U.S. Environmental Protection Agency (EPA) has also promulgated NAAQS for particulate matter less than or equal to 2.5 µm in aerodynamic diameter (PM-2.5) (62 FR 38652), and a new 8-hour NAAQS for O_3 to replace the 1-hour O_3 standard (62 FR 38856).

The NAAQS are expressed as concentrations of pollutants in the ambient air; that is, in the outdoor air to which the general public has access [40 CFR Part 501(e)]. Primary NAAQS define levels of air quality that EPA deems necessary, with an adequate

Table 3.2.1 National Ambient Air Quality Standards (NAAQS) for criteria pollutants

	Primary (Health related)		Secondary (Welfare related)	
Pollutant	Averaging period	Concentration	Averaging period	Concentration
CO	8-hour[a]	9 ppm (10 mg/m^3)	No secondary standard	
	1-hour[a]	35 ppm (40 mg/m^3)	No secondary standard	
Pb	Maximum quarterly average	1.5 µg/m^3	Same as primary standard	
NO_2	Annual arithmetic mean	0.053 ppm (100 µg/m^3)	Same as primary standard	
O_3	Maximum daily 1-hour average[b]	0.12 ppm (235 µg/m^3)	Same as primary standard	
	4th highest 8-hour daily maximum[c]	0.08 ppm (157 µg/m^3)	Same as primary standard	
PM-10	Annual arithmetic mean[d]	50 µg/m^3	Same as primary standard	
	24-hour[d]	150 µg/m^3	Same as primary standard	
PM-2.5	Annual arithmetic mean[e]	15 µg/m^3	Same as primary standard	
	98th percentile 24-hour[e]	65 µg/m^3	Same as primary standard	
SO_2	Annual arithmetic mean	80 µg/m^3 (0.03 ppm)	3-hour[a]	1300 µg/m^3 (0.50 ppm)
	24-hour[a]	365 µg/m^3 (0.14 ppm)		

[a]Not to be exceeded more than once per year.

[b]The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is equal to or less than 1, as determined according to Appendix H of the Ozone NAAQS.

[c]The 8-hour standard is met when the 3-year average of the annual 4th highest daily maximum 8-hour O_3 concentration is less than or equal to 0.08 ppm.

[d]The annual PM-10 standard is attained when the expected annual arithmetic mean concentration is less than or equal to 50 µ/m^3 (3-year average); the 24-hour standard is attained when the expected number of days above 150 µg/m^3 is less than or equal to 1 per year.

[e]The annual PM-2.5 standard is met when the annual average of the quarterly mean PM-2.5 concentrations is less than or equal to 15 µg/m^3, when averaged over 3 years. If spatial averaging is used, the annual averages from all monitors within the area may be averaged in the calculation of the 3-year mean. The 24-hour standard is met when the 98th percentile value, averaged over 3 years, is less than or equal to 65 µg/m^3.

margin of safety, to protect human health. Secondary NAAQS are similarly designated to protect human welfare by safeguarding environmental resources (such as soils, water, plants, and animals) and manufactured materials. States may modify NAAQS to make them more stringent, or set standards for additional pollutants. New York has added additional standards for criteria pollutants [e.g., 99% of 3-hour and 24-hour SO_2 concentrations shall not exceed 0.25 ppm (650 $\mu g/m^3$) and 0.10 ppm (261 $\mu g/m^3$), respectively.] New York has also set ambient air quality standards for non-methane hydrocarbons, fluorides, beryllium, and hydrogen sulfide. The New York standards are not quantified further or used in the analysis (Section 4.1.2.2) because Greenidge Station's air emissions during demonstration of the proposed project would decrease or continue at the same level, with the exception of ammonia (NH_3) (Section 2.1.7.1).

Yates County, as well as adjoining Seneca County, is in attainment with NAAQS and state ambient air quality standards for all pollutants (John Kent, New York State Department of Environmental Conservation, personal communication to Robert Miller, ORNL, March 11, 2004). Because the air quality falls within standards, no ambient air quality monitoring stations are located in these counties. SO_2 monitoring stations are located in Rochester, about 50 miles northwest of Dresden, and in Elmira, about 45 miles south-southeast of Dresden. PM-2.5 monitoring stations are also located in Rochester. A PM-10 monitoring station is located in Niagara Falls, about 120 miles west-northwest of Dresden, and an NO_2 monitoring station is located in Buffalo, about 100 miles west-northwest of Dresden. O_3 monitoring stations are located in Rochester, Elmira, and Williamson, about 45 miles north-northwest of Dresden.

In addition to ambient air quality standards, which represent an upper bound on allowable pollutant concentrations, national air quality standards exist for Prevention of Significant Deterioration (PSD) (40 CFR Part 51.166). The PSD standards differ from the NAAQS in that the NAAQS specify maximum allowable concentrations of pollutants, while PSD requirements provide maximum allowable increases in concentrations of pollutants for areas already in compliance with the NAAQS. PSD standards are therefore expressed as allowable increments in the atmospheric concentrations of specific pollutants. Allowable PSD increments currently exist for three pollutants (NO_2, SO_2, and PM-10). One set of allowable increments exists for Class II areas, which cover most of the United States, and a much more stringent set of allowable increments exists for Class I areas, which include many national parks and monuments, wilderness areas, and other areas as specified in 40 CFR Part 51.166(e). Allowable PSD increments for Class I and Class II areas are given in Table 3.2.2. The PSD Class I area nearest to Greenidge Station is Lye Brook Wilderness Area in Vermont, about 200 miles to the east-northeast.

Contaminants other than the criteria pollutants are present in the atmosphere in varying amounts that depend on the magnitude and characteristics of the sources, the distance from each source, and the residence time of each pollutant in the atmosphere. In the ambient air, many of these pollutants are present only in extremely small concentrations, requiring expensive state-of-the-art equipment for detection and measurement. Measurements of existing ambient air concentrations for many hazardous pollutants are, at best, sporadic. Regulation of these pollutants is attempted at the sources; emissions from specific source categories are regulated by the National Emissions Standards for Hazardous Air Pollutants (40 CFR Part 61; 40 CFR Part 63). However,

electric utilities are not included among the specific source categories to which these regulations apply.

Table 3.2.2. Allowable increments for Prevention of Significant Deterioration (PSD) of air quality

Pollutant	Averaging period	Allowable increment ($\mu g/m^3$) Class I[a]	Class II[a]
Sulfur dioxide (SO_2)	3-hour	25	512
	24-hour	5	91
	Annual	2	20
Nitrogen dioxide (NO_2)	Annual	2.5	25
Particulate matter less than 10 μm in aerodynamic diameter	24-hour	8	30
	Annual	4	17

[a]Class I areas are specifically designated areas (e.g., national parks greater than 6,000 acres in area) in which the degradation of air quality is to be severely restricted. Class II areas (which include most of the United States) have a less stringent set of allowable increments.

3.3 SURFACE WATER RESOURCES

3.3.1 Hydrology

Seneca Lake is the largest of the 11 Finger Lakes in the Oswego River Basin of Central New York. The Finger Lakes were formed by about 20 cycles of glacial advances and retreats (Schuyler County 2003). Seneca Lake holds about 50% of the volume of all of the Finger Lakes. It is 35 miles long and averages about 2 miles in width. The average depth is 290 ft; the maximum depth is 651 ft. The typical lake elevation is 446 ft; flooding has been known to raise the level to a maximum of 450.2 ft. The lake rarely freezes over; since 1912 ice cover has apparently occurred only in localized, near shore-areas (SLAP-5 1999).

Greenidge Station lies to the south of the Keuka Lake Outlet which it flows into and joins Seneca Lake to the east. Keuka Lake Outlet drains the Keuka Lake watershed; the elevation of Keuka Lake is 715 ft (SLAP-5 1999).

At the U.S. Geological Survey (USGS) gauging station closest to the proposed project location (approximately 0.25 mile to the west), streamflow in the Keuka Lake Outlet averaged 120 cubic ft per second (cfs) in 2001, with a range of annual mean flows of 85 to 395 cfs over the period from 1966 through 2001 (USGS 2004). The average daily mean flows have ranged from 6 cfs in March of 2002 to 1540 cfs in May of 1996 (USGS 2004).

3.3.2 Water Quality and Use

3.3.2.1 Water Quality

Seneca Lake rates high in the quality spectrum of large U.S. lakes (SLAP-5 1999). Its water meets all drinking water standards established by the EPA under the Safe Drinking Water Act and provides Class "AA" drinking water to 70,000 residents within its watershed (SLAP-5 1999).

General clarity is about 15 ft in summer to 30 ft in winter. The water is chloride rich (150 mg/L), but well below concentrations (greater than 250 mg/L) which pose a health risk (SLAP-5 1999). The pH of Seneca Lake is slightly alkaline, 8.0 to 9.0, and varies with season and depth. Seneca Lake water is moderately hard, with total hardness concentrations of 140 – 150 mg/L (ppm $CaCO_3$). Dissolved oxygen concentrations are at or near saturation throughout the water column during the entire year (SLAP-5 1999).

Biological parameters indicate that Seneca Lake is borderline oligotrophic/mesotrophic. Very low nutrient concentrations, especially phosphate, prevent algal blooms and associated green coloration observed in smaller lakes of the region and prevent dissolved oxygen depletion in the hypolimnion during the late summer (SLAP-5 1999).

3.3.2.2 Water Use

Greenidge Station uses water for three primary purposes: noncontact cooling, service water, and potable water. Units 3 and 4 use once-through cooling water for noncontact condensing of steam exhausted from the turbines. About 93,000 gpm of water are withdrawn for this purpose from Seneca Lake through two underwater intake structures, one for each unit (Section 2.1.6.2). Service water for the entire plant (about 500 gpm) is also withdrawn from the intake serving Unit 3. Potable water (about 1.2 gpm) is supplied by the Penn Yan municipal water system.

3.3.3 Effluent Discharges

Cooling water from the units exits through their discharge pipelines to Seneca Lake via the discharge channel that flows into Keuka Lake Outlet (Section 2.1.6.2). Service water is treated prior to discharge to C pond (an unlined settling pond), which ultimately drains to Seneca Lake. C pond also receives treated wastewater from plant site activities and treated stormwater runoff from the lined coal pile. Stormwater runoff is collected at the Lockwood Landfill which has an underground leachate collection system that conveys water to an existing sedimentation pond where it is sampled and treated, if necessary. It is ultimately discharged through an outfall point to the Keuka Lake Outlet. Discharge of these water sources through their outfall points is regulated under the facility's State Pollutant Discharge Elimination System (SPDES) permit, which limits the discharge volume and specifies effluent limitations.

Other industrial, municipal, and private water users withdraw from and discharge into the Seneca Lake watershed, but in smaller quantities than Greenidge Station (SLAP-5 1999). These discharges are regulated through SPDES permits. Fifty-one SPDES permits allow large-scale discharge into surface waters in the watershed; twenty-one allow discharge directly to Seneca Lake (SLAP-5 1999). The largest two users, Cargill

Salt Company and U.S. Salt Corporation (both of Watkins Glen, New York), each discharge about 10% of Greenidge Station's discharge to Seneca Lake (9,200 and 6,700 gpm, respectively). The next largest users are Marsh Creek Wastewater Treatment Plant in Ontario County, which discharges about 2,800 gpm to Seneca Lake, followed by Penn Yan Sewage in Yates County, which discharges about 1,260 gpm to Keuka Lake Outlet. Other users discharge much lower volumes (SLAP-5 1999).

3.3.4 Thermal Discharge

Discharge of condenser cooling water to Seneca Lake is regulated under the SPDES permit, which limits discharge to 190 million gallons per day (MGD). Actual discharges are well below this limit. The average and maximum daily discharges for August were both 145 MGD. In November the average discharge was 133 MGD, and the maximum was 135 MGD (AES Greenidge 2003a,b).

Permitted effluent temperature limits are 108°F in summer months and 86°F in winter months. The maximum allowable temperature increase under the permit is 31°F in the winter and 26°F in the summer. Actual temperatures and temperature increases are well below these limits. The highest effluent temperature in 2003 was 99°F, recorded in August (a summer month). The maximum temperature increase that month was 17°F. In November 2003 (a winter month) the maximum temperature increase was also 17°F and the maximum effluent temperature was 74°F.

3.4 GEOLOGICAL RESOURCES

3.4.1 Geology and Topography

The Greenidge Station site is located in the glaciated Allegheny Plateau physiographic province. The station and the surrounding area are underlain by a thick sequence of sedimentary rock of middle to late Devonian age (approximately 360 to 375 million years old), consisting predominantly of shale and siltstone, but also including sandstone and several distinct calcareous (limestone) layers. The strata have a slight dip toward the south.

Continental glaciation during the Pleistocene Epoch had a major influence on regional topography. Glacial erosion deepened preglacial stream valleys into a semi-parallel series of deep, narrow linear troughs that form the fiord-like basins of the Finger Lakes. Upland bedrock surfaces are mantled by varying thicknesses of glacial till (unsorted sediment deposited directly by glacier ice) and stratified glacial drift (sediments deposited by glacial meltwater). Thick sequences of glacial sediment also fill the deeper portions of the basins of the Finger Lakes.

Greenidge Station is on the western shore of Seneca Lake, south of the mouth of the Keuka Outlet stream. Seneca Lake is the largest of the Finger Lakes at 35 miles long, about 1.9 miles wide on average, and as much as 650 ft deep. Its bedrock valley extends down to about 1,000 ft below sea level (Callinan 2001). The lake basin is oriented nearly due north-south. North of the power station and west of the lake, upland surfaces slope gently eastward toward the lake. The Keuka Outlet stream, which carries outflow from Keuka Lake to Seneca Lake, occupies a deep valley, with local relief of more 150 ft. Upland elevations, and thus topographic relief, increase to the south of the power station,

where the short streams draining the uplands are more deeply incised than are similar streams north of the power station.

Surficial materials at the power station site include glacial sediments and fly ash (in former waste disposal areas). Past site development activities in the area where new structures would be built for the proposed project included removal of surficial materials, exposing the bedrock surface.

Lockwood Landfill occupies a 143-acre site about 1/4 mile west of Greenidge Station. In its natural state the site had a northward slope, from an elevation of about 660 ft at the southwest corner of the property to less than 550 ft in the north end of the tract, near the Keuka Outlet stream. Silt-clay glacial till, ranging from 1 to 11 ft thick with an average thickness of about 4.5 ft, mantles the bedrock. This material is characterized as gravelly sandy clay silt to silty sand with clayey gravel, reflecting its unsorted character. Permeability of the till is very low; hydraulic conductivity values measured in the field ranged from 4.2×10^{-5} to 1.1×10^{-7} cm/sec. Site preparation for some portions of the landfill included placement of borrow soil (excavated from an adjoining area) on the ground surface to provide a minimum 5-ft thickness of soil above the groundwater table. Glacial deposits are thicker on portions of the AES property north of the waste disposal area, ranging from 25 to 80 ft thick (Criss 2004).

3.4.2 Geological Hazards

Geologic hazards are minimal at the site of the proposed project. The local bedrock is not subject to dissolution or subsidence, and the glacial sediments on the power station and landfill properties are naturally compacted mineral materials that are not subject to settlement or subsidence. Underground mining has not been conducted in the area. In the Seismic Zoning Map for the New York State Seismic Building Code proposed in 1993 by the New York State Earthquake Code Advisory Committee (Multidisciplinary Center for Earthquake Engineering Research 2004.), Yates County is included in Seismic Zone A. This is the lowest seismic risk classification in the state and the only mapped seismic zone characterized as “low risk.” In this zone there is less than a 10% chance of a peak ground acceleration of 0.09 g (that is, 9% of the acceleration of gravity) in a 50-year period. A more recent set of estimates by the US Geological Survey indicates that the peak ground acceleration with a 10% chance of occurring in a 50-year period in the Dresden area is just 0.03 g (USGS 2002).

3.4.3 Geological Resources

Mineral resources of economic value in the area surrounding Greenidge Station include sand and gravel, clay and glacial till, and natural gas (Division of Mineral Resources 2004). In 2001 twelve active sand and gravel pits and one operation for mining of clay and glacial till were active in Yates County. Five gas wells were in production in Yates County in 2001 and 2002. Production of natural gas in the state of New York has been declining since a peak year in the 1980s.

Another economic use of geologic resources in the area is underground storage of natural gas. One underground natural gas storage facility exists in Yates County (Division of Mineral Resources 2004). Another potential use of these resources is the study and collection of invertebrate fossils, which are abundant in some of the Devonian rock strata of the region. However, bedrock exposures are limited.

3.4.4 Groundwater

Groundwater is an important resource in the region. Over half of the population of Yates County relies on groundwater for drinking water supply, primarily in rural areas away from the lake shores (Winkley 2001). Permeable sands and gravels deposited by glacial meltwater form the most productive aquifers in the area, but in many areas the only source of groundwater supply is the relatively low-permeability bedrock (Keuka Lake Foundation 1996), in which groundwater occurs and moves almost entirely in fractures (Merin 1992). Domestic wells in the region typically yield less than 5 gpm (USDA Forest Service 2001).

No groundwater is used on the Greenidge Station site. Some seepage from C pond (the unlined settling pond described in Section 3.3.3) enters the shallow groundwater system. Quarterly sampling of a network of about 30 onsite monitoring wells distributedaround the property has not detected adverse effects from station operations (Eileen Reynolds, AES, personal communication to Ellen Smith, ORNL, May 25, 2004). Groundwater beneath the site discharges to Seneca Lake.

Monitoring wells at the Lockwood Landfill site allow observations of groundwater conditions, including water levels and water quality, both up- and downgradient from the disposal area. Groundwater moves from southwest to northeast, mirroring the natural topography. Depth to groundwater in shallow wells is typically between 5 and 20 ft, with greater depths recorded on the downgradient side of the landfill. Observations in pairs of shallow and deep wells indicate a strong downward gradient from the till into the underlying bedrock. Most groundwater movement is believed to occur in the upper portion of the bedrock (Criss 2004). No water supply wells exist north of the landfill between the disposal area and the Keuka Outlet stream (north and northwest of the site), where shallow groundwater moving north from the landfill area would discharge to the surface water system.

Groundwater quality at the Lockwood Landfill is strongly influenced by the chemistry of the rock units in which wells are completed. The natural chemical characteristics of site groundwater, as observed in background monitoring wells, typically include slightly alkaline pH (7.0 to 7.5) and very high hardness and alkalinity (both hardness and alkalinity are consistently above 250 mg/L). Water with these attributes is generally suitable for use as drinking water, but its hardness and its characteristically high concentrations of iron (frequently exceeding 0.3 mg/L in unfiltered samples) and total dissolved solids (450-570 mg/L) may be objectionable for some users and some types of domestic uses. Additionally, some unfiltered water samples from background wells have exceeded drinking water quality criteria for specific metals, including antimony and cadmium (Criss 2004).

Leachate collection systems within the Lockwood Landfill and groundwater underdrains beneath unlined portions of the landfill collect water that has percolated through disposed waste. This water exhibits substantially elevated levels of many constituents, but as of the end of 2002 monitoring of downgradient monitoring wells had not detected water quality changes attributable to landfill contamination (Criss 2004). The clay-rich soil and bedrock at the landfill site can be expected to have geochemical attributes that would help to retard the transport of many dissolved contaminants.

3.5 FLOODPLAINS AND WETLANDS

3.5.1 Floodplains

The entire proposed project site would be located outside the Federal Emergency Management Agency's delineated 500-year floodplain for Keuka Lake Outlet and Seneca Lake (FEMA 1987).

3.5.2 Wetlands

The proposed project would be located in an existing, developed industrial site containing no wetlands. The closest actual wetland area to the project site is about 1,200 ft to the northwest across the Keuka Lake Outlet. This wetland is about five acres in size and is classified by the U.S. Fish and Wildlife Service (FWS) as an inland forested wetland (FWS 2004a). Another wetland occurs about 1,400 ft to the north of the proposed project site along the confluence of Keuka Lake Outlet with Seneca Lake. Here, a long narrow strip of FWS-classified inland herbaceous wetland totaling about 1.5 acres in size lies on the south bank of the outlet and extends into the lake (FWS 2004a).

3.6 ECOLOGICAL RESOURCES

3.6.1 Terrestrial Ecology

The proposed project would be located in the Laurentian Mixed Forest Province (Ecological Subregion) of the United States (Bailey 1995). This province is transitional between the boreal forest and the broadleaf deciduous zones. In the Seneca Lake watershed more than 90% of the remaining forests are mixed northern hardwood and oak (SLAP-5 1999). The proposed project would occupy about 3 acres of developed industrial property in the midst of the 153-acre Greenidge Station. The proposed project site is characterized by an almost complete lack of natural ecological resources. Vegetation occurs in the project area only on isolated unpaved areas (e.g., road shoulders and cut slopes) and includes a mixture of grasses, herbaceous species (e.g., mullen), and brush consisting of sumac, ailanthus, and red cedar. Isolated patches of forest occur in the area surrounding Greenidge Station, along with open fields, residential development, and other industrial sites.

Wildlife is abundant and varied due to the variety of land uses in the Seneca Lake basin. Among the most prominent are several species of songbirds and shorebirds and mammals including white-tailed deer, beaver, groundhog, skunk, opossum, gray squirrel, Eastern coyote, red fox, muskrat, and cottontail rabbit (SLAP-5 1999). Seneca Lake has a significant concentration of wintering waterfowl. Diving ducks use the whole lake, and mallard and American black ducks concentrate around Dresden station. Other species present include greater scaup, canvasback, redhead, common goldeneye, buffelhead, common merganser, and Canada goose. The closest wildlife management area to the proposed project, the Willard Wildlife Management Area, is located across Seneca Lake in the Town of Ovid, about 5 miles east of Greenidge Station.

3.6.2 Aquatic Ecology

Seneca Lake supports a substantial fishery consisting predominantly of lake trout, smallmouth bass, and yellow perch. Other species such as rainbow trout, brown trout, landlocked-Atlantic salmon, northern pike, and largemouth bass add diversity to the fishery. In addition, alewives (sawbellies) and rainbow smelt provide a dependable forage base for trout and salmon (SLAP-5 1999). The fishery has benefited from steady annual stockings of 60,000 lake trout, 65,000 brown trout, and 24,000 Atlantic salmon. All other fish species are sustained entirely by natural reproduction. An important factor in a recent resurgence of the Seneca fishery is the New York State Department of Environmental Conservation's (NYSDEC's) ongoing control of the invasive, parasitic sea lamprey. The control program involves applying a highly selective chemical lampricide to known sea lamprey nursery areas in Catherine Creek and Keuka Lake Outlet at three-year intervals (SLAP-5 1999).

Another invasive species, the zebra mussel, has more recently invaded Seneca Lake and was first observed late in the summer of 1992. Today zebra mussels have colonized almost every suitable shallow-water habitat, filter-feeding on the plankton. Changes in lake water opacity, nutrient concentrations, and chlorophyll-a concentrations from the early 1900s to 1998 suggest that zebra mussels have decreased the algal concentrations in Seneca Lake and increased water clarity. Starting in 1998 and continuing through 1999 however, these trends reversed. The variability indicates the lack of complete understanding of the present extent and future impact of zebra mussels on the ecology of the lake and its fishery (SLAP-5 1999).

3.6.3 Threatened and Endangered Species

The FWS (FWS 2004b) lists 12 non-marine animal and 6 plant species, which are either threatened or endangered, that may occur in the state of New York. Of these only two species, Indiana bat (endangered) and Leedy's roseroot (threatened), are known to be found in Yates County (EPA 2004). The state of New York lists many species of animals (NYSDEC 2003a) and plants (NYSDEC 2003b) as either threatened or endangered. Some of these state-listed species are known to occur in the Seneca Lake watershed (SLAP-5 1999). Of the threatened and endangered species in the watershed, only one plant, Leedy's roseroot (state endangered, also federally threatened), has been confirmed to be in Yates County (NYSDEC 2003b). The state-listed endangered, short-eared owl (Asio flammeus) could possibly occur in Yates County (NYSDEC 2003a; SLAP-5 1999). Because the proposed project site is already highly disturbed and offers virtually no suitable habitat for any of these species, they are unlikely to occur at the site.

3.6.4 Biodiversity

The proposed project site is located within an area of the United States that exhibits reasonably good biodiversity at the state and ecoregion scales. Numerous ecosystem types and plant, mammalian, and avian species contribute significantly to the overall biodiversity. Based on (1) the variety of surviving habitats and (2) the number of species in the more visible classes of plants and animals observed in the environs, the area within a few miles of the proposed project exhibits moderately high biodiversity. The proposed project site itself exhibits little biodiversity because previous industrial

development has almost completely destroyed the native habitats that were once present, as well as the wildlife communities they supported.

3.7 CULTURAL RESOURCES

Although no record exists of a cultural resources survey of the Greenidge Station property, the proposed project site has been disturbed by power plant construction and operations since the 1950s, and no cultural resources have been reported or found on or near the site (CONSOL 2002). In Yates County, 61 properties are listed on the *National Register of Historic Places* (NPS 2004). The two *National Register* properties closest to the proposed project site are the Robert Ingersoll Birthplace and the Christopher Willis House, both located in the town of Dresden about 0.5 mile northwest of the project site.

3.8 SOCIOECONOMICS

This section contains data on the socioeconomic resources most likely to be affected by the proposed project. Most of the data are for communities in Yates County, where the proposed project site is located, but some are for Ontario County and the city of Geneva because they would also experience socioeconomic impacts from the proposed project.

3.8.1 Population

Table 3.8.1 contains population data for Yates County, Ontario County, and some of the local communities most likely to be affected by the proposed project. As indicated in Table 3.8.1, both Yates County and Ontario County experienced moderate population growth (7.9% and 5.4%, respectively) between 1990 and 2000. Dresden, the community closest to the proposed project site, is a small village with around 300 residents. It is anticipated that most of the additional workers associated with construction of the proposed project would reside in the village of Penn Yan (population 5,219) or the city of Geneva (population 13,617), each of which experienced population declines between 1990 and 2000.

Table 3.8.1. Population data for Yates County, Ontario County, and selected communities

Location	1990 Population	2000 Population	Percent change 1990-2000
Yates County	22,810	24,621	7.9
Penn Yan	5,248	5,219	(0.6)
Dresden	NA	307	NA
Ontario County	95,101	100,224	5.4
Geneva	14,143	13,617	(3.7)

NA=Not available

Sources: U.S. Census Bureau 1994; U.S. Census Bureau 2004a; U.S. Census Bureau 2004b

3.8.2 Employment and Income

Table 3.8.2 contains employment and income data for Yates County and Ontario County in 2000. The unemployment rate in Yates County (6.4%) was higher than that in

the United States (5.8%), but lower than that in the state of New York (7.1%). The unemployment rate in Ontario County (4.5%) was lower than both the state and national rates. Both counties had per capita incomes in 2000 lower than those of the state of New York ($23,289) and the United States ($21,587) (U.S. Census Bureau 2004b).

Table 3.8.2. Employment and income data for Yates County and Ontario County in 2000

Location	Labor force	Number Employed	Number Unemployed	Unemployment rate (%)	Per capita income ($)
Yates County	11,959	11,191	768	6.4	16,781
Ontario County	53,200	50,822	2,378	4.5	21,533

Source: U.S. Census Bureau 2004b

Table 3.8.3 contains data on employment by industry or economic sector in Yates County and Ontario County in 2000. Employment patterns are similar in both counties, with the largest sector being educational, health, and social services, followed by manufacturing and retail trade.

The largest employer in Yates County is the Penn Yan Central School District with 400 employees. Other large employers in Yates County include the Soldiers and Sailors Memorial Hospital in Penn Yan (342 full-time and 181 part-time employees), Yates County government (310 employees), and the Yates County Chapter of the New York State Association for Retarded Citizens, Inc. (190 full-time and 125 client employees) (YCIDA 2003).

Greenidge Station currently employs 44 people, the majority of whom reside in Penn Yan (85%) and Geneva (10%). Total employee payroll at Greenidge Station in 2003 was over $6.4 million (AES Greenidge 2004).

3.8.3 Housing

Table 3.8.4 contains housing data for Yates County, Ontario County, and some of the local communities most likely to be affected by the proposed project. Yates County has a relatively high vacancy rate (25.2%), probably due to the large number of tourist and vacation properties in the area. Penn Yan (6.4%) and Geneva (10.1%), the communities in which most current Greenidge Station employees reside, have much lower vacancy rates than Yates County. The housing stock in Penn Yan and Geneva is relatively old, with 56.2% and 65.3% of the housing units, respectively, built before 1940 (Table 3.8.4).

3.8.4 Water and Wastewater Services

Although many residents of Yates County rely on private wells for their water supply, residents of Penn Yan and Dresden receive their water from a water treatment facility located in Penn Yan. The Penn Yan water treatment facility has a capacity of 1.77 MGD and currently operates at about 0.8 MGD (Steve Isaacs, Yates County Industrial Development Agency, personal communication to Bo Saulsbury, ORNL, February 11, 2004).

Penn Yan also has a wastewater treatment facility with a capacity of 1.8 MGD and current use of about 1.0 MGD. For several years, however, Penn Yan's wastewater treatment system has had a recurring problem with infiltration and/or infill, in which

Table 3.8.3. Employment by industry or economic sector in Yates County and Ontario County in 2000

	Yates County		Ontario County	
Industry	**Number**	**Percent**	**Number**	**Percent**
Educational, health, and social services	3,096	27.7	12,891	25.4
Manufacturing	1,713	15.3	9,557	18.8
Retail trade	1,251	11.2	6,378	12.5
Arts, entertainment, recreation, accommodation, and food services	801	7.2	3,889	7.7
Construction	839	7.5	3,327	6.5
Professional, scientific, management, administrative, and waste management services	512	4.6	3,485	6.9
Wholesale trade	306	2.7	1,440	2.8
Agriculture, forestry, fishing and hunting, and mining	731	6.5	952	1.9
Other services (except public administration)	484	4.3	2,248	4.4
Finance, insurance, real estate, and rental and leasing	420	3.7	2,095	4.1
Public administration	423	3.8	1,732	3.4
Transportation and warehousing, and utilities	438	3.9	1,685	3.3
Information	177	1.6	1,143	2.3
Total	11,191	100	50,822	100

Source: U.S. Census Bureau 2004b

Table 3.8.4. Housing data for Yates County, Ontario County, and selected communities in 2000

	Yates County	Penn Yan	Dresden	Ontario County	Geneva
Total housing units	12,064	2,281	149	42,647	5,573
Occupied units	9,029	2,135	128	38,370	5,009
Vacant units	3,035	146	21	4,277	564
Vacancy rate (%)	25.2	6.4	14.1	10.0	10.1
Median value, owner-occupied ($)	75,600	70,400	63,200	94,100	69,300
Median rent, renter-occupied ($)	467	453	605	564	474
Units built before 1940 (%)	39.3	56.2	78.5	34.4	65.3

Source: U.S. Census Bureau 2004b

groundwater gets into the sewer system through leaks in the pipes, joints, and other structures. During periods of high groundwater flow, this additional water in the sewer system causes added demand (and cost) to the operation of the treatment system (Penn Yan 1999). The town of Penn Yan is currently trying to resolve this wastewater treatment issue. Residents of the village of Dresden rely on septic systems for wastewater disposal.

3.8.5 Local Government Revenues

The 2004 budget for Yates County is projecting over $32.6 million in total revenues, with $10.2 million coming from local property and school taxes (YCIDA 2004). In 2003, Greenidge Station paid Yates County $784,862 in property taxes and $888,877 in school taxes (AES Greenidge 2004).

3.8.6 Environmental Justice

Table 3.8.5 contains the percentages of the total population that are classified as "minority" and "below poverty" for the United States, the state of New York, Yates County, and the five Census Tracts within Yates County. Yates County and its five Census Tracts have much lower minority percentages than the United States and the state of New York. Yates County's percentage below the poverty level (13.1%) is slightly lower than that of the state of New York (14.6%), but is slightly higher than that of the United States (12.4%).

Within Yates County, Census Tract 9905 and Census Tract 9901 each have slightly higher percentages below the poverty level (16.0% and 15.2%, respectively) than

Yates County, the state of New York, and the United States. Both Census Tract 9905 and Census Tract 9901 are located in the eastern part of Yates County, between Seneca Lake and Penn Yan. The proposed project site at Greenidge Station is located within Census Tract 9901.

Table 3.8.5. Environmental justice data for the United States, the state of New York, Yates County, and the five Census Tracts within Yates County

Place	% Minority[1]	% Below Poverty[2]
United States	30.9	12.4
State of New York	38.0	14.6
Yates County	3.2	13.1
Census Tracts within Yates County		
CT 9901	4.4	15.2
CT 9902	3.0	13.2
CT 9903	2.5	9.5
CT 9904	2.4	11.6
CT 9905	3.5	16.0

[1]Includes all persons who identified themselves as not "White alone," plus those who identified themselves as both "White alone" and "Hispanic or Latino."
[2]Represents individuals below the poverty level as defined by the U.S. Census Bureau.
Sources: U.S. Census Bureau. 2004a; U.S. Census Bureau 2004b

3.9 TRANSPORTATION AND NOISE

3.9.1 Transportation

3.9.1.1 Roads

Road access to the proposed project site is from State Highway 14, a two-lane north/south highway that parallels Seneca Lake through eastern Yates County (Figure 2.1.1). In 2003, annual average daily traffic (ADT) was 2,595 vehicles on the segment of Highway 14 closest to the proposed project (i.e., between State Highway 54 and County Route 36). This traffic volume represents a "Volume/Capacity Ratio" of 0.1 (i.e., the road segment is at 10% of capacity), and the level of service on Highway 14 near the proposed project site is "very good" (Bill Piatt, New York State Department of Transportation Region 6, personal communication to Bo Saulsbury, ORNL, February 11, 2004). The New York State Department of Transportation has no road construction activities planned for Highway 14 or for any other roads in Yates County (NYSDOT 2004).

Access to the proposed project site from Highway 14 is via Lampman Road, a short, two-lane gravel road currently used by employee vehicles and delivery trucks coming to and from Greenidge Station.

3.9.1.2 Rail

Rail access to the proposed project site is from a CSX trunk rail line that is currently used to transport coal to Greenidge Station. Under current operations, a train of 50 rail cars delivers coal to the station about twice per week. Occasionally, a train of 100 cars transports coal to the Dresden area, with 50 cars moved to Greenidge Station to remove the coal, while the remaining 50 cars are parked at a railroad siding immediately north of Dresden until they can be switched with the empty 50-car section at Greenidge Station.

3.9.2 Noise

Noise can be defined as unwanted sound. Noise becomes annoying when it is loud enough to be heard above the usual background sounds to which people have become accustomed. Background levels, in turn, vary with location and time of day. Sound levels are measured in decibels (dB); measured values are normally adjusted to account for the response of the human ear, in which case they are expressed as decibels as measured on the A-weighted scale [dB(A)].

Greenidge Station sits in a rural area on the west bank of Seneca Lake. The village of Dresden, where residential dwellings line the shores of the lake, is located 1 mile northwest of the proposed project. There is no residential population within a quarter mile of the proposed project (Radder 2002). According to a survey by Goodfriend and Associates (1971), sound levels at Greenidge Station are similar to those at other industrial plants. The relatively steady noise resulting from Greenidge Station is augmented by the presence of other sound sources in the area, including vehicular traffic, farming traffic (i.e., tractors, grape harvesters) nearby passing trains, recreational activities, and other industrial activities. For example, sound levels may exceed 100 dB(A) within 50 ft of a train passing on one of the nearby railroad tracks. Although the presence of Seneca Lake precludes stationary noise sources to the east of Greenidge Station, motorboats using the lake generate noise. Residential areas are minimally affected by Greenidge Station.

Neither Torrey Township nor the City of Dresden Codes contain ordnances regarding noise. No documented, noise-related complaints associated with Greenidge Station have been identified. Past construction activities at Greenidge Station did not generate noise that triggered documented noise-related complaints.

In addition to the guideline level of 55 dB(A) given by the Environmental Protection Agency (EPA 1974), a level of 90 dB(A) is specified by the Occupational Safety and Health Administration (OSHA) (29 CFR Part 1910.95) as the maximum occupational exposure during an 8-hour period for protection against hearing loss. When worker noise exposure levels equal or exceed an 8-hour time weighted average (TWA) of 85 dB(A), the employer is required to administer a continuing effective hearing conservation program. This 85 dB(A) represents an action level. Greenidge Station has a hearing conservation program in place for all workers.